

Name: _____

Date: _____

A2 CC Adding and Subtracting Radicals

Do Now: Simplify each assuming all variables represent positive numbers.

1. $4\sqrt[4]{81x^{16}y^8z^4}$

2. $\sqrt{250a^4b^5c^{13}}$

Adding and subtracting radicals is done in a similar manner as adding and subtracting polynomials. We need to combine **like radicals**. **Like radicals** are radicals that have the same index and the same radicand. Also the coefficients must be “like” to combine. It is often necessary to simplify radicals in order to tell if the radicals are like.

Examples; Perform the indicated operations.

1. $6\sqrt{7} - 4\sqrt{7}$

2. $2\sqrt{5} + 9 - \sqrt{20}$

3. $\sqrt{125b} + \sqrt{12b} - \sqrt{45b} + \sqrt{75b}$

4. $\sqrt[3]{64x} - \sqrt[3]{8x} + \sqrt[3]{27x}$

$$5. \sqrt{250a^2} + \sqrt{10a^2}$$

$$6. \sqrt{24xa^2} + \sqrt{54xa^2}$$

$$7. 2\sqrt{32x^2y^3} - xy\sqrt{98y}$$

$$8. 2\sqrt{3y} - 5y^2 + 4\sqrt{3y} + \sqrt{36y^4}$$

$$9. \sqrt{63a^3} - \sqrt{45a^3}$$

Writing About Mathematics

1. Danielle said that $3x\sqrt{\frac{1}{3x}}$ could be simplified by writing $3x\sqrt{\frac{1}{3x}}$ as $\sqrt{\frac{9x^2}{3x}} = \sqrt{3x}$. Do you agree with Danielle? Justify your answer.
2. Does $\sqrt{16} + \sqrt{48} = \sqrt{64}$? Justify your answer.

Developing Skills

In 3–38 write each expression in simplest form. Variables in the radicand with an even index are non-negative. Variables occurring in the denominator of a fraction are non-zero.

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| 3. $\sqrt{2} + 5\sqrt{2}$ | 4. $6\sqrt{5} - 4\sqrt{5}$ |
| 5. $8\sqrt{3} + \sqrt{3}$ | 6. $5\sqrt{7} - \sqrt{7}$ |
| 7. $\sqrt{50} + \sqrt{2}$ | 8. $3\sqrt{5y} - \sqrt{20y}$ |
| 9. $\sqrt{250a^2} + \sqrt{10a^2}$ | 10. $8\sqrt{11b^4} - \sqrt{99b^4}$ |
| 11. $\sqrt{24xy^2} + \sqrt{54xy^2}$ | 12. $\sqrt{200a^7} - \sqrt{50a^7}$ |
| 13. $\sqrt{98c^5} - \sqrt{18c^5}$ | 14. $x\sqrt{32x} + \sqrt{128x^3}$ |
| 15. $4b\sqrt{24b^3} + \sqrt{54b^5}$ | 16. $3x^3\sqrt{80} + 2\sqrt{125x^6}$ |
| 17. $\sqrt{5} + \sqrt{\frac{1}{5}}$ | 18. $\sqrt{24} + 2\sqrt{\frac{3}{2}}$ |
| 19. $14\sqrt{\frac{1}{7}} + \sqrt{28}$ | 20. $\sqrt{\frac{1}{2x}} + \sqrt{\frac{1}{2x}}$ |
| 21. $a\sqrt{45} + \sqrt{20a^2} - 5\sqrt{2a}$ | 22. $x\sqrt{600} - 2\sqrt{24x^2} + 4x\sqrt{96}$ |
| 23. $2\sqrt{3y} - 5y^2 + 4\sqrt{3y} + \sqrt{36y^4}$ | 24. $\sqrt{162a^4b^3} + 3 - ab\sqrt{18a^2b} - 1$ |
| 25. $\sqrt{12} - \sqrt{24} + \sqrt{48} + \sqrt{27}$ | 26. $5\sqrt{\frac{1}{5}} - \sqrt{\frac{1}{10}} + \sqrt{20}$ |
| 27. $\sqrt{\frac{1}{6}} + \sqrt{\frac{8}{3}} - \sqrt{\frac{2}{3}}$ | 28. $\sqrt[3]{2} + \sqrt[3]{16}$ |
| 29. $\sqrt[3]{54} + \sqrt[3]{128}$ | 30. $\sqrt[4]{48} - \sqrt[4]{3}$ |
| 31. $\sqrt{9x} + \sqrt{25x}$ | 32. $\sqrt{100y} - \sqrt{25y}$ |
| 33. $\sqrt{8a} - \sqrt{2a}$ | 34. $\sqrt{18b^2} + \sqrt{800b^2}$ |
| 35. $\sqrt{63a^2} - \sqrt{45a^2}$ | 36. $\sqrt{4ab^2} - \sqrt{ab^2}$ |
| 37. $\sqrt{50x^3} + \sqrt{200x^3}$ | 38. $\sqrt{49x^3} - 2x\sqrt{4x}$ |